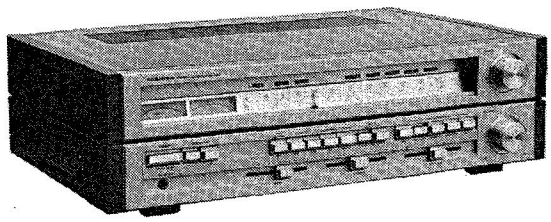
SERVICE DATA
FILE NO. 170-027

TOSHIBA

AM/FM STEREO RECEIVER

SA-520



SPECIFICATIONS

■ SEMICONDUCTORS

FETs	6
IC's	2
Transistors	42
Diodes	24
Zener Diodes	3

■ AMPLIFIER SECTION

Power Output
- **40 watts per channel, min. RMS, at 4 ohms from 20 Hz to 20 KHz.**
- **35 watts per channel, min. RMS, at 8 ohms from 20 Hz to 20 KHz.**
- **20 watts per channel, min. RMS, at 16 ohms from 20 Hz to 20 KHz.**
- **With no more than 0.4% total harmonic distortion.**

Continuous Power Output	
1 KHz (Both channels driven) :	40W + 40W 8 ohm
	50W + 50W 4 ohm
Total Harmonic Distortion	
20 Hz ~ 20 KHz Continuous Power Output	Less than 0.4%
1W + 1W Power Output :	Less than 0.05%
Intermodulation Distortion	
Continuous Power Output :	Less than 0.4%
1W + 1W Power Output :	Less than 0.05%
Power Bandwidth (IHF Both channels driven) :	5 Hz ~ 60 kHz (THD 0.4%)
Output Speaker :	A, B, A + B (4 ~ 16 ohm)
Frequency Response :	10 ~ 50 ±1 dB
Input Sensitivity/Impedance :	1.5 V/30K ohm
MAIN IN	
Damping Factor (1 KHz, 8 ohm) :	More than 45
Residual Noise	
(8 ohm through Pre & Power Amplifier) :	Less than 1 mV
Input Sensitivity/Impedance	
PHONO 1 :	2.5 mV/47K ohm
PHONO 2 :	2.5 mV/47K ohm
PHONO Overload Level (rms) :	150 mV
AUX :	150 mV/50K ohm
TAPE PLAY 1, 2 :	150 mV/50K ohm
TAPE PLAY 2 (DIN connector) :	150 mV/50K ohm
Output Level	
TAPE REC. 1, 2 :	150 mV
TAPE REC. 2 (DIN connector) :	30 mV
Frequency Response	
PHONO (RIAA equalization) :	30 Hz ~ 15 kHz ±1 dB
AUX, TAPE PLAY :	20 Hz ~ 40 kHz ±1 dB
Tone Control	
BASS :	±10 dB (100 Hz)
TREBLE :	±10 dB (10 kHz)
Tone Filter	
High cut Filter :	-3 (50 Hz) 6 dB/oct
Low cut Filter :	-3 (8 kHz) 6 dB/oct
Loudness Control :	+8.5 dB (100 Hz)
(Volume control set at -40 dB position) :	+3.5 dB (10 kHz)
S/N (IHF short-circuited, A net work)	
PHONO :	More than 70 dB
AUX TAPE PLAY :	More than 90 dB

■ FM SECTION

Receiving Frequency :	88 ~ 108 MHz
Usable Sensitivity (IHF) :	1.8μV
Capture Ratio (IHF) :	1.0 dB
Selectivity (IHF) :	65 dB
S/N :	70 dB (MONO)
	65 dB (STEREO)
Image Rejection (98 MHz) :	80 dB
IF Rejection (98 MHz) :	100 dB
Spurious Rejection :	100 dB
AM Suppression :	55 dB
Harmonic Distortion MONO :	Less than 0.2%
STEREO :	Less than 0.4%
Frequency Response :	20 Hz ~ 15 kHz
	+0.2, -2.0 dB
Stereo Separation 1 kHz :	More than 40 dB
50 Hz ~ 10 kHz :	More than 30 dB
Sub-carrier Suppression :	40 dB
Antenna Inputs :	300 ohm Balanced
	75 ohm Unbalanced
FM Muting :	ON – OFF

■ AM SECTION

Receiving Frequency :	525 ~ 1605 kHz
Sensitivity (IHF, Ferrite antenna) :	200μV/m
(IHF, Ext. antenna) :	15μV
Selectivity :	35 dB
S/N :	50 dB
Image Rejection :	50 dB
IF Rejection :	65 dB

■ MISCELLANEOUS

Power Requirement :	AC 120 V 60 Hz or 220/240 V ~ 50 Hz
Power Consumption :	190W (AC 120 V 60 Hz), 310W (220/240 V ~ 50 Hz)
Dimensions :	530(W) x 163(H) x 435(D) (mm)
Weight (body) :	17 Kg

■ FURNISHED PARTS

FM T-type Antenna :	1
Owner's Guidebook :	1

Note:
Specifications and design subject to change without notice due to continuing improvements.

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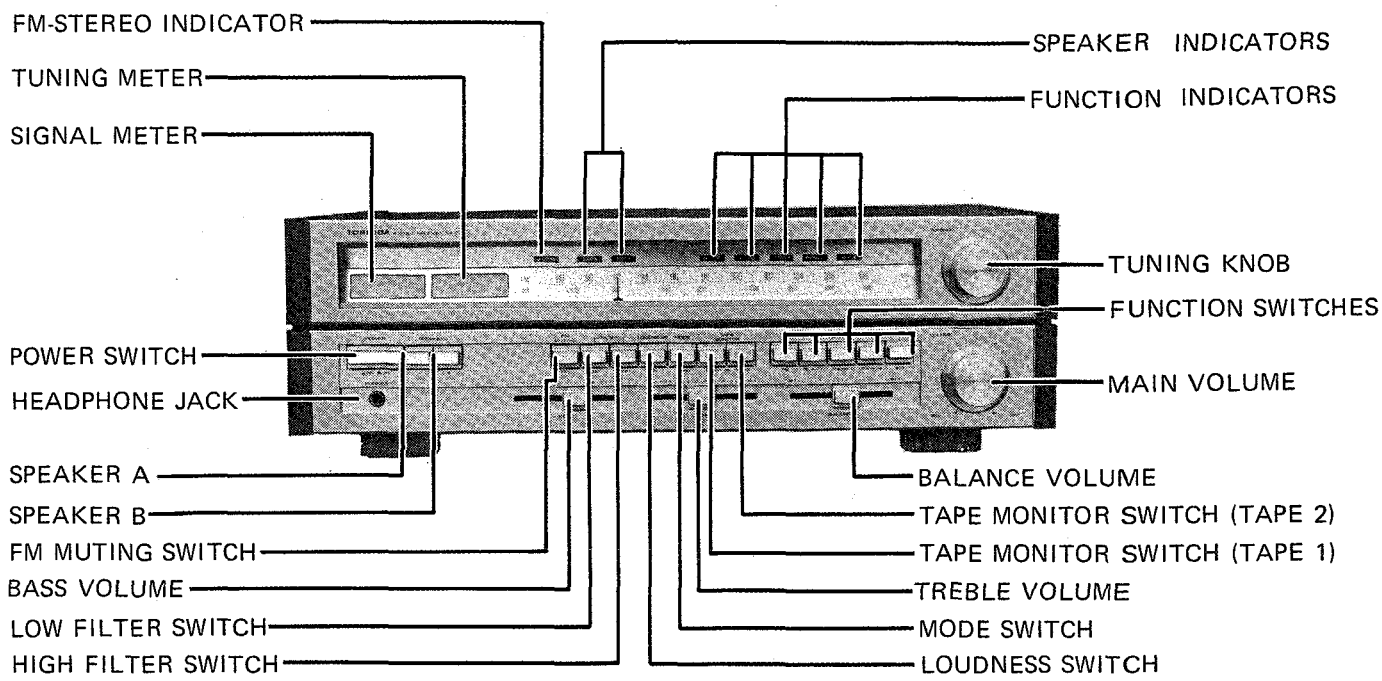
FEATURES

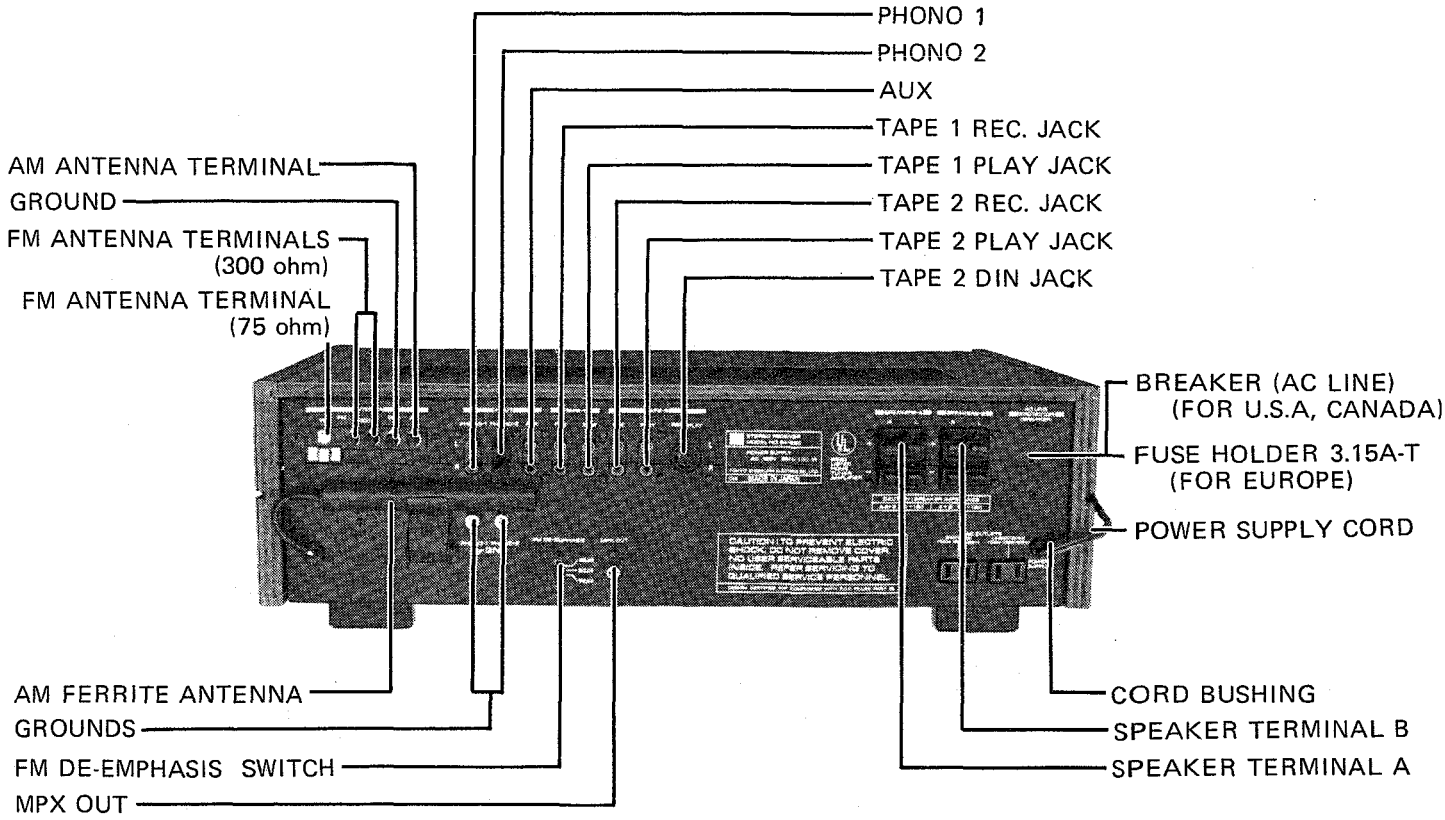
1. Automatic Reset Protective Circuit (Speaker Protection, Power Transistor Protection)
2. Totally Direct-connected Pure Complementary OCL Power Amplifier
3. FM Front-end using FET and Four-variable Capacitors
4. Wide Scale Dial (FM Frequency Linear Type)
5. FM De-emphasis Built-in Change-over Switch
6. 22-Step Detent Volume

1. OPERATING CONTROLS

1–1 FRONT VIEW

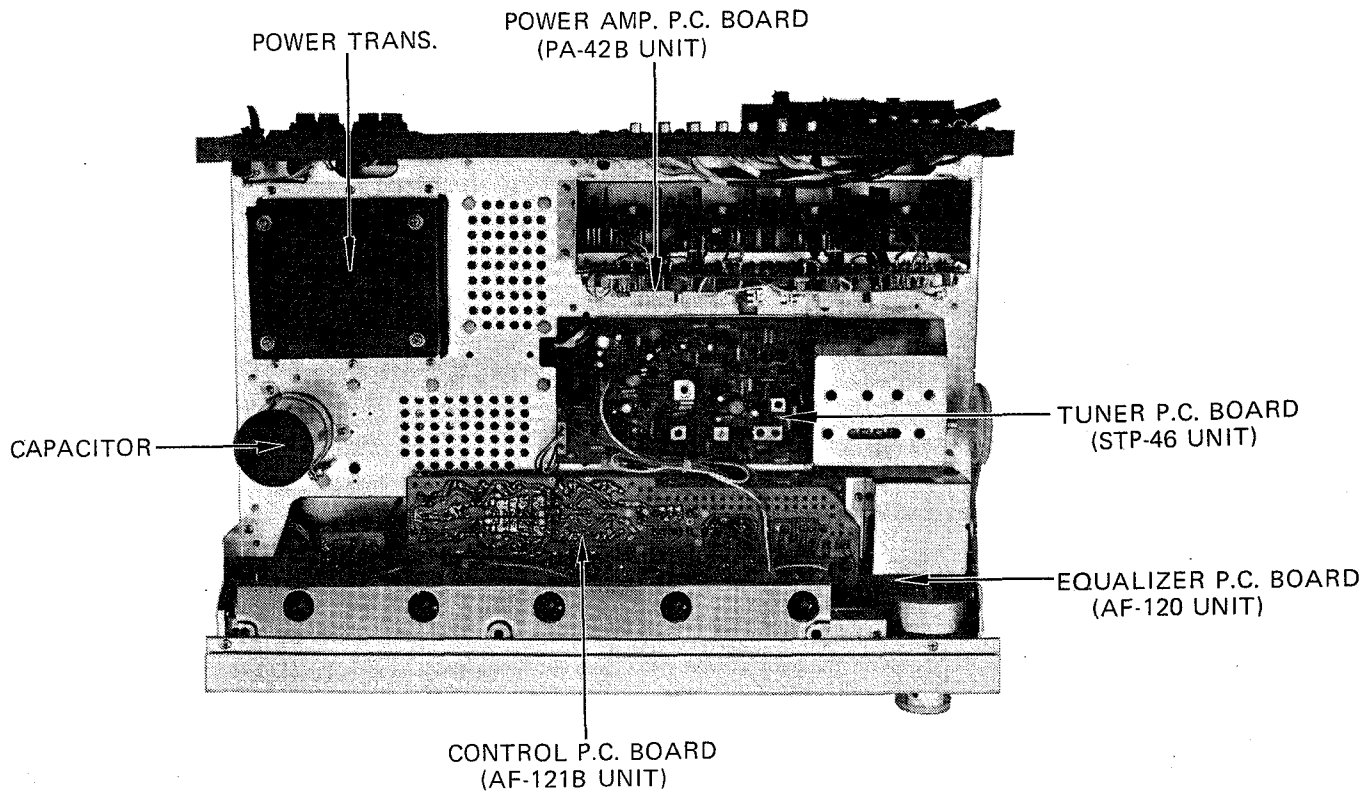


1–2 REAR VIEW

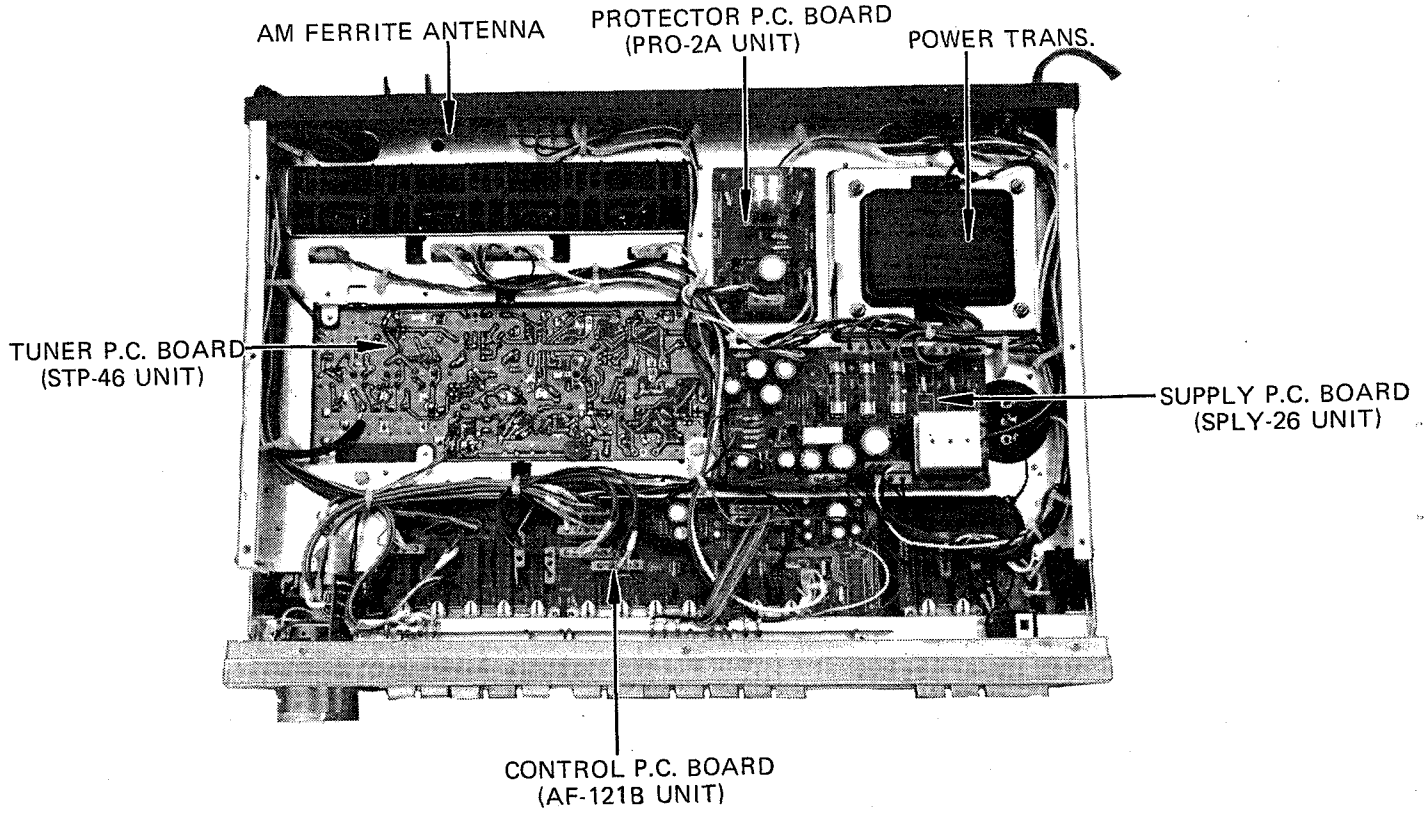


2. PARTS LOCATIONS

2–1 CHASSIS TOP VIEW



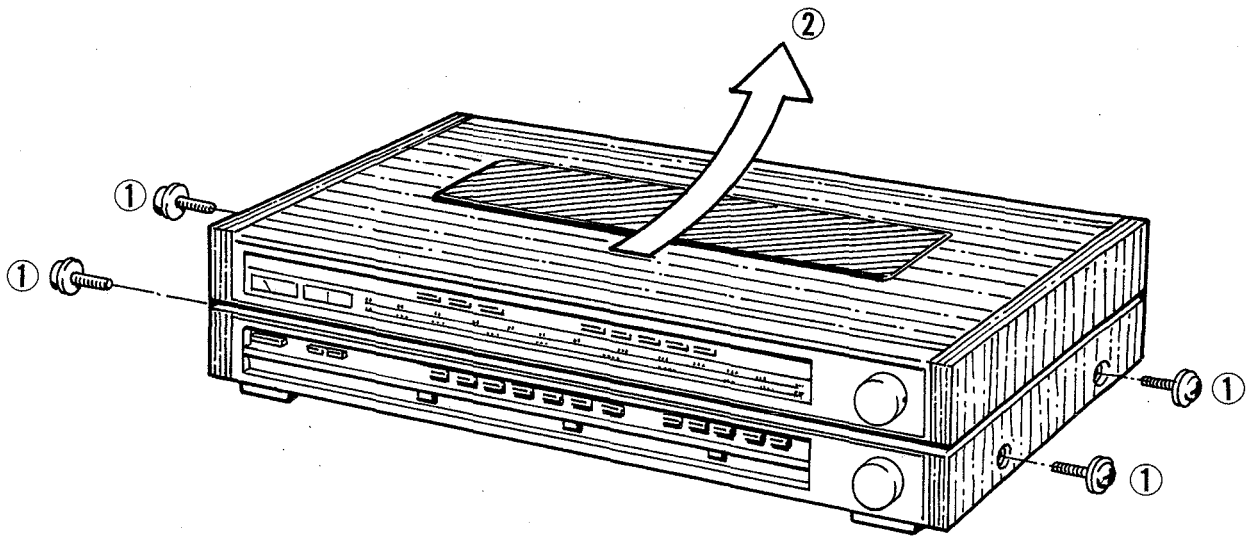
2–2 CHASSIS BOTTOM VIEW



3. DISASSEMBLY INSTRUCTIONS

3–1 CABINET REMOVAL

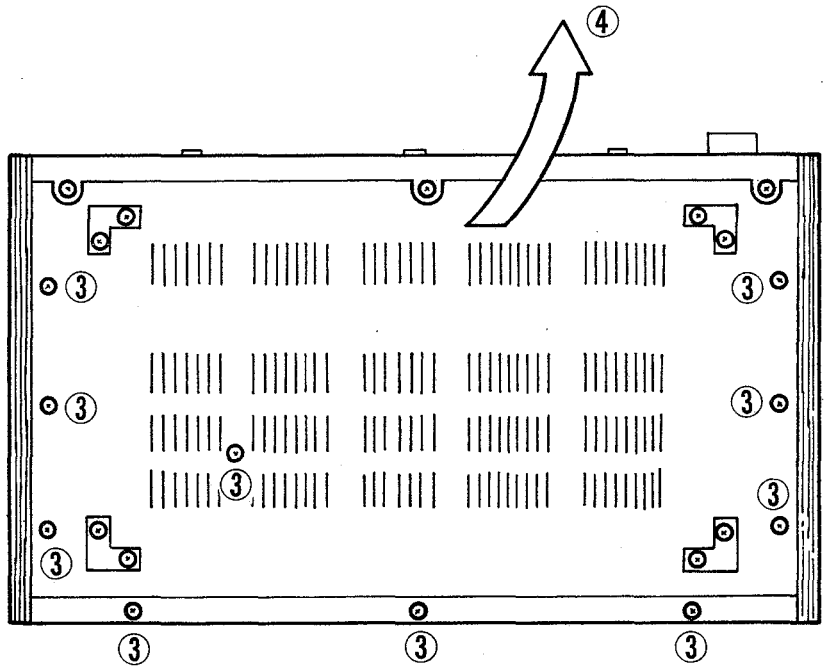
1. Remove four screws ①.
2. Open the cabinet in the direction ②.



(Fig. 1)

3–2 BOTTOM BOARD REMOVAL

1. Remove ten screws ③.
2. Open the bottom board in the direction ④.



(Fig. 2)

4. TECHNICAL POINTS

1. AUTOMATIC RESET PROTECTIVE CIRCUITS

1 Speaker Protection:
This device keeps direct current voltage in a definite value through whole circuits and prevents the speaker from low-pass shock, allowing the power source to be connected to the speaker only in 3 to 6 seconds after the power switch is turned on. As the speaker is disconnected immediately after the power switch is turned off prior to the disconnection of all power sources, the speaker is free from effect of unstable fluctuating electrical potential which is produced while the direct voltage is reduced to zero.

2 Power Transistor Protection:
This device prevents the power transistor from damage caused by disconnecting the speaker when the speaker terminal is short-circuited or when using the speaker rated 4 ohm or less.
Being operated by automatic reset electronic circuit, the above device eliminates the trouble of manual reset operation.

2. HIGH PRECISION 22 DETENTS VOLUME

This device is an attenuator type volume and regulates gang error and step error in 7 to 22 steps within ±1 dB. Attenuating value in each step is as follows:

Step	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Attenuating Value	-80	-70	-60	-50	-40	-34	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	-4	-2	0

3. TOTALLY DIRECT-CONNECTED PURE COMPLEMENTARY OCL POWER AMPLIFIER

As employing a direct-connected circuit without connection capacitor in its power amplifier, this unit holds flat characteristics over all ranges from ultra low-pass to high-pass field (10Hz ~ 50kHz ±1 dB).
Power bandwidth is as wide as from 20Hz or more to 20kHz or less on both channels driven (output is 35W at 8 ohm load), and T.H.D. is regulated within 0.4%.

4. HIGH PERFORMANCE FM TUNER

Being equipped with Four-variable capacitors and FET in FM front-end, and also high integrated circuit of exceeding limitter characteristics and ceramic filter in IF section, this unit features in high sensitivity (1.8μV, IHF) and high selectivity which enables the unit to receive a stable signal in frequency range from weak signal to strong signal, making the unit almost free from disturbance caused by other stations.

5. HIGH RELIABILITY PLL MPX IC

Being incorporated PLL IC in FM tuner MPX circuit, there is no characteristic deterioration caused by the change of temperature or humidity or aging.

6. MPX-OUT TERMINAL, DE-EMPHASIS SELECT SWITCH

This unit is supplied with MPX-OUT terminal and de-emphasis change-over switch (25μs – 50μs — 75μs) which are provided for reception of FM 4 channel and FM Dolby broadcasts in future.

5. CIRCUIT ADJUSTMENTS

5–1 POWER AMP. ADJUSTMENT

TEST EQUIPMENTS AND TOOLS REQUIRED

1. Voltage tester (Lower Range)
2. Adjustment screw driver with negative head; ⊖

IDLING ADJUSTMENT

R channel

1. Touch on the both sides of the RESISTOR (R531) with tester.
   Then turn the SEMI-FIXED RESISTOR (VR 503) left and right with an adjustment screwdriver.
2. Adjust the voltage at both sides of the RESISTOR (R531) to 10 ± 2 mV.

L channel

1. Touch on the both sides of the RESISTOR (R532) with tester.
   Then turn the SEMI-FIXED RESISTOR (VR504) left and right with an adjustment screwdriver.
2. Adjust the voltage at both sides of the RESISTOR (R532) to 10 ± 2 mV.

CENTER BALANCE ADJUSTMENT

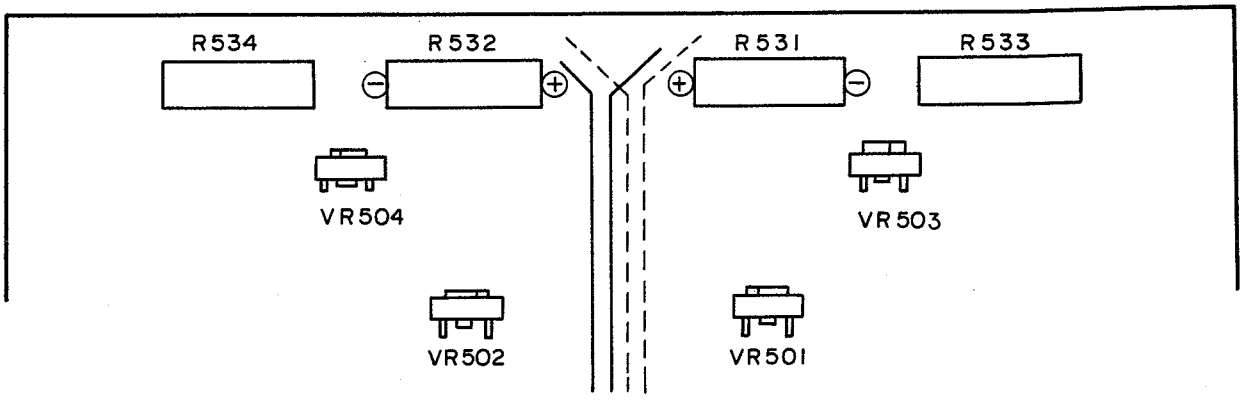
R channel

1. Touch on the one side (–) of the RESISTOR (R531) and Chassis frame with contact as shown in Fig. 3.
   Then turn the SEMI-FIXED RESISTOR (VR501) left and right with an adjustment screwdriver.
2. Adjust the voltage to 0 ± 5 mV.

L channel

1. Touch on the one side (–) of the RESISTOR (R532) and chassis frame with contact as shown in Fig. 3.
   Then turn the SEMI-FIXED RESISTOR (VR502) left and right with an adjustment screwdriver.
2. Adjust the voltage to 0 ± 5 mV.

NOTE: When voltage reading is impossible, change the positive and negative sides of contact.



(Fig. 3)

5–2 AM ADJUSTMENT

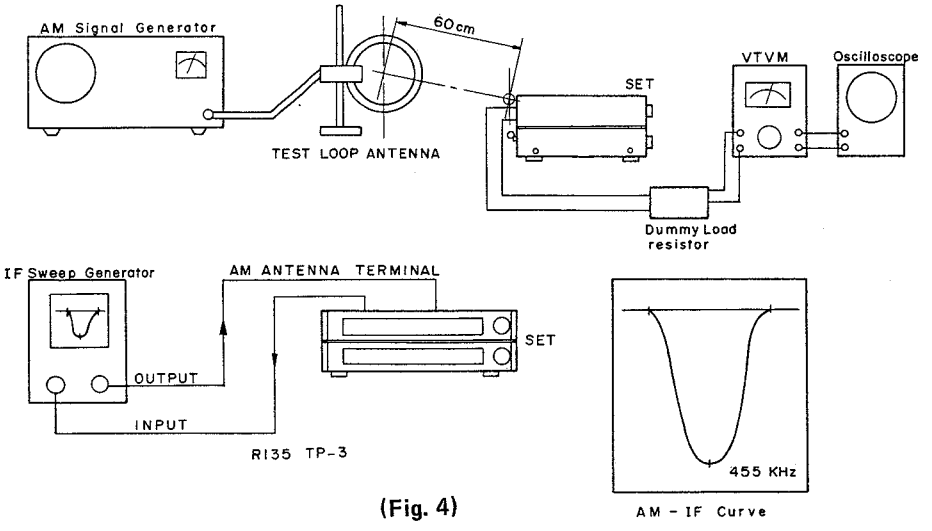
1. Turn on the AM signal generator and the VTVM allowing a fifteen minute warm-up period.
2. Using the test loop across the output of the signal generator, inductivity connect the signal generator to the receiver.
3. Connect the VTVM across the voice coil or an 8 ohm dummy load.
4. Set signal generator frequency as listed in AM ADJUSTMENT CHART and maintain a sufficient output level to provide an indication on VTVM.
5. Set volume control at mid-position.
6. Proceed as outlined in AM ADJUSTMENT CHART.

TEST EQUIPMENTS AND TOOLS REQUIRED

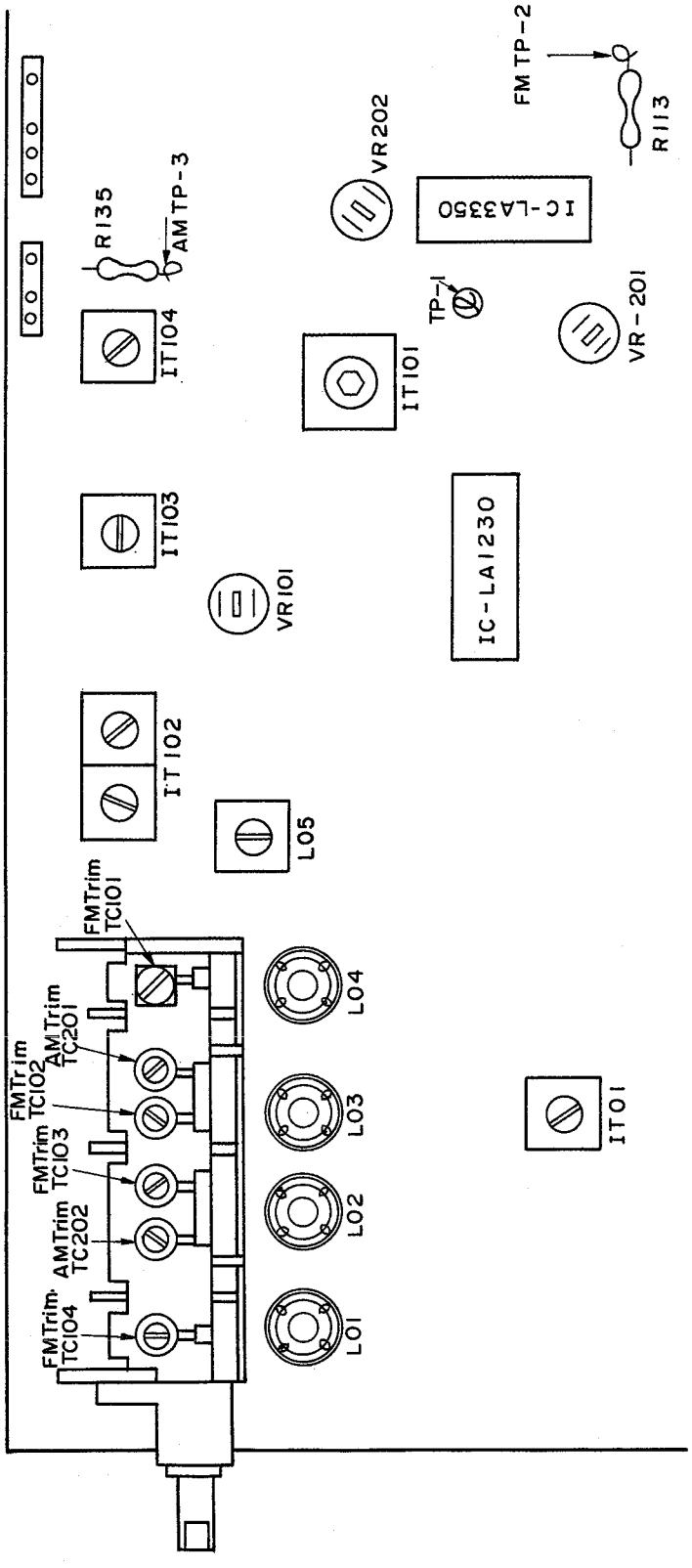
1. AM signal generator with a frequency range at least from 455 kHz to 23 MHz.
2. IF sweep generator.
3. Osilloscope with a wide range amplifier of approximately 100 kHz.
4. VTVM.
5. Dummy load resistor (8 ohm)
6. Test loop antenna.

AM ADJUSTMENT CHART

Item	Step	Signal Generator Frequency	Radio Dial Setting	Adjustment	Remarks
IF	1	455 kHz	Tuning gang fully counterclockwise Lowest Frequency	IT 102 103 104	Adjust for maximum indication
AM	2	515 kHz	Tuning gang fully counterclockwise Lowest Frequency	OSC. Coil L 05	Adjust for maximum indication
	3	1650 kHz	Tuning gang fully clockwise Highest Frequency	OSC. Trim TC 201	Adjust for maximum indication
	4	Repeat steps 2 and 3 as required			
	5	600 kHz	Tune to Signal	FERRITE ANT. Coil	Adjust for maximum indication
	6	1400 kHz	Tune to Signal	AM ANT. Trim TC 202	Adjust for maximum indication
	7	Repeat steps 5 and 6 as required			



(Fig. 4)



(Fig. 5)

CAUTION

When realigning the FM receiving frequency, the lowest side of the frequency range must not be below 87.5 MHz in order to comply with FTZ regulations in West Germany.

5–3 FM ADJUSTMENT

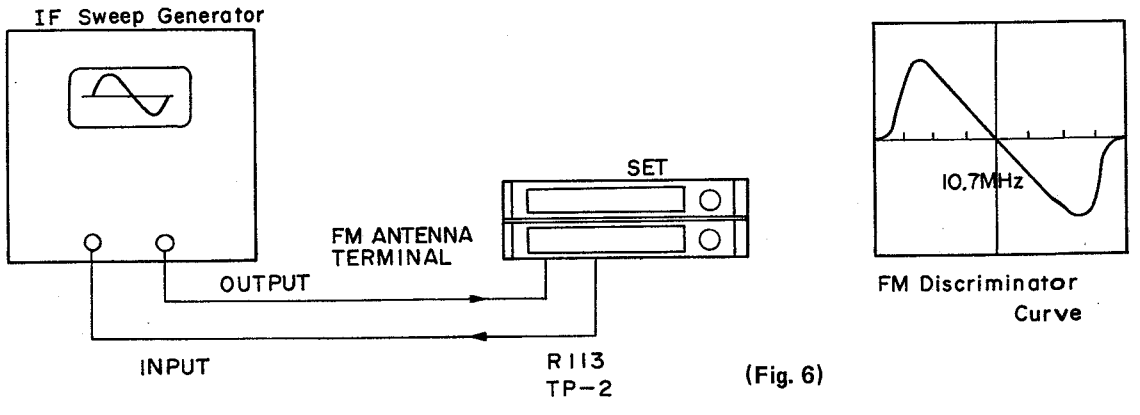
1. Turn on the FM signal generator and the VTVM allowing a fifteen minute warm-up period.
2. Connect the VTVM across the voice coil or 8 ohm dummy load.
3. Set signal generator frequency as listed in FM ADJUSTMENT CHART and maintain a sufficient output level to provide an indication on VTVM.
4. Set volume control to mid-position.
5. Proceed as outlined in FM ADJUSTMENT CHART.

TEST EQUIPMENTS AND TOOLS REQUIRED

1. FM signal generator with a frequency range at least from 10 MHz to 220 MHz.
2. IF sweep generator.
3. Osilloscope with a wide range amplifier of approximately 100 KHz.
4. VTVM
5. FM dummy antenna (300 ohm)
6. Dummy load resistor (8 ohm)
7. FM-ST MODULATOR

FM ADJUSTMENT CHART

Item	Step	Signal Generator Frequency	Radio Dial Setting	Adjustment	Remarks
IF	1	10.7 MHz	Tuning gang fully counterclockwise (Lowest Frequency)	IT 01 IT 101 (secondary)	Adjust for the best waveform
OCS Freq. Response	2	87.5 MHz	Tuning gang fully counterclockwise (Lowest Frequency)	OSC Coil L04	Adjust for maximum indication
	3	109 MHz	Tuning gang fully clockwise (Highest Frequency)	OSC Trim TC 101	Adjust for maximum indication
	4	Repeat steps 2 and 3 as required			
RF Tracking	5	88 MHz	Tune to signal	ANT. Coil L01/L02/L03	Adjust for maximum indication
	6	108 MHz	Tune to signal	FM-ANT Coil TC102/TC103/TC104	Adjust for maximum indication
	7	Repeat steps 4 and 5 as required			



(Fig. 6)

5–4 FM MPX ADJUSTMENT

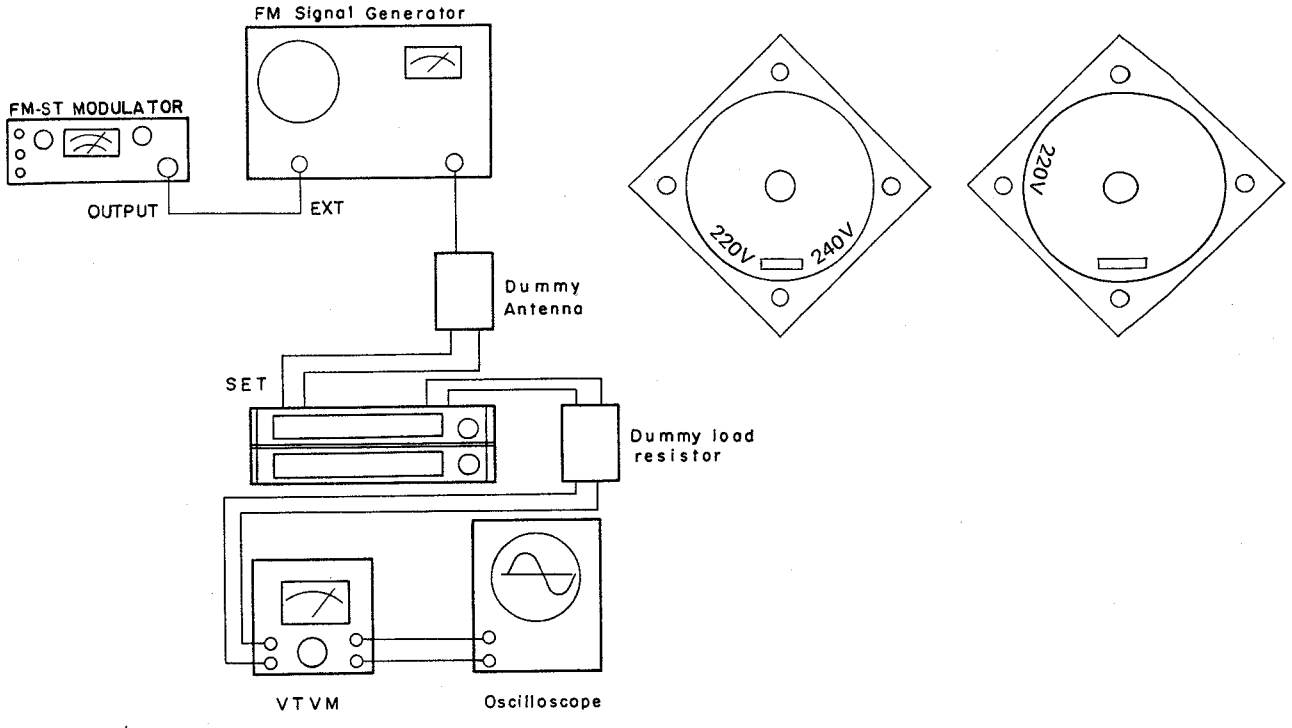
1. Turn on the FM signal generator and the VTVM allowing fifteen minute warm-up period.
2. Connect the signal generator across the FM antenna terminal.
3. Connect the VTVM across the voice coil or 8 ohm dummy load.
4. Set signal generator frequency as listed in FM MPX ADJUSTMENT CHART and maintain a sufficient output level to provide indication on VTVM.
5. Set volume control knob to mid-position.
6. Proceed as outlined in FM MPX ADJUSTMENT CHART.
7. Set the function switch to FM-AUTO and connect frequency counter to TP-1.
8. Adjust semi-fixed resistor (R201) so that the reading on frequency counter is 19 kHz.

FM MPX ADJUSTMENT CHART

Item	Step	Signal Generator Frequency	Radio Dial Setting	Adjustment	Remarks
Pilot Signal Adjustment	1	No signal	Any position	VR 201	Adjust so that the frequency is 19 kHz.
Separation Adjustment	2	98 MHz (1 kHz, 90% MOD) L channel	98 MHz	VR202	Adjust R channel output level to minimum indication.

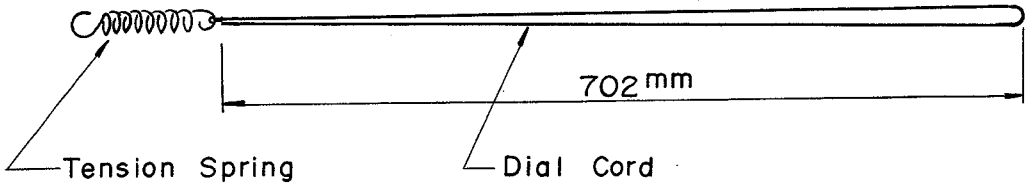
NOTICE FOR VOLTAGE SELECTOR SWITCH SETTING (For Europe Model)

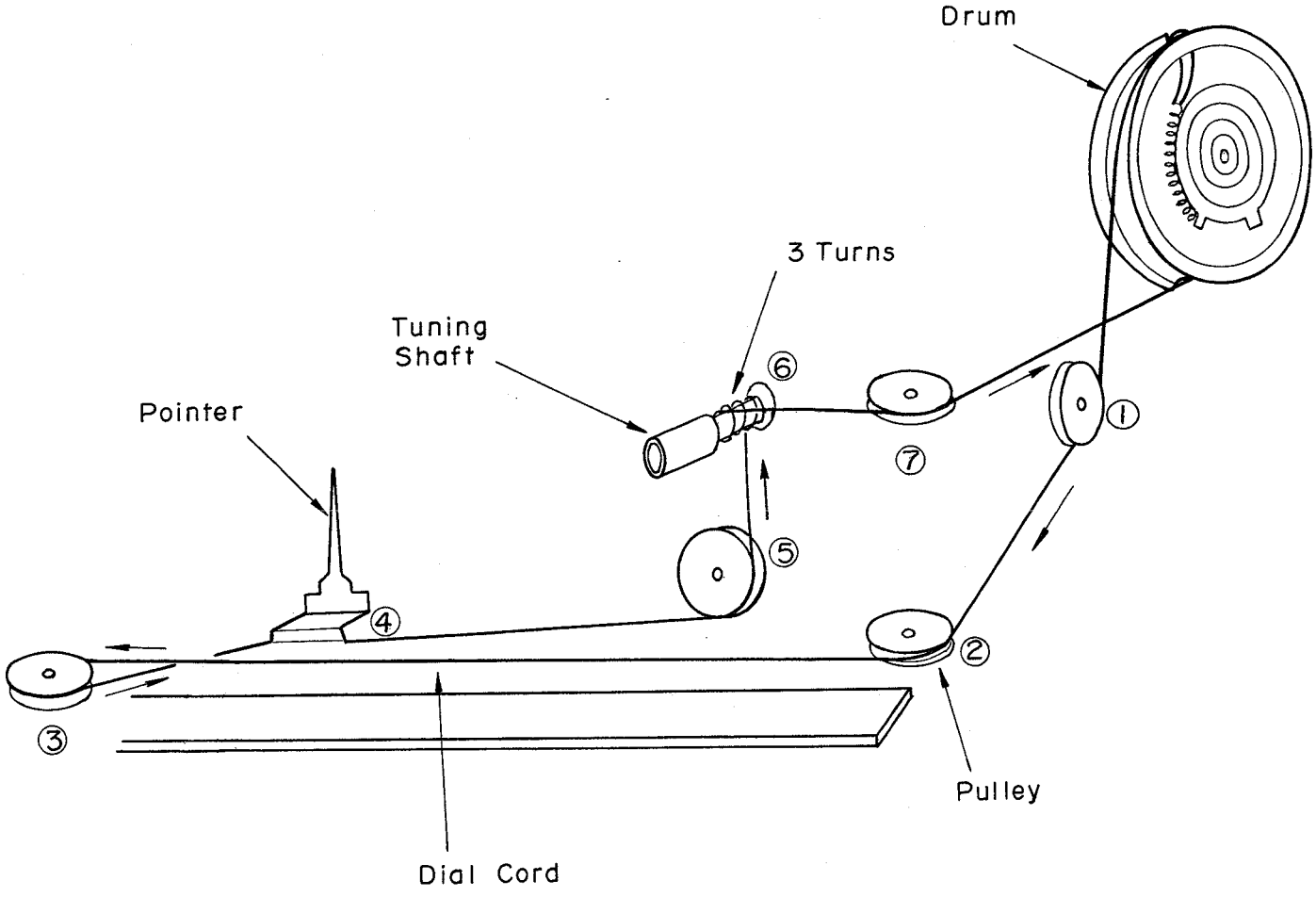
Do not set voltage selector switch between 220 V and 240 V, even though the actual power source is 230 V or 250 V. As clearly seen from the illustrations below, the switch should not be set to the position where there is no indication. In case of resetting, make sure the switch is turned correctly, setting the voltage indicator to the window of voltage selector switch cover in order to prevent the power transformer and the set itself from being damaged or burnt out.



(Fig. 7)

6. DIAL CORD RESTRINGING

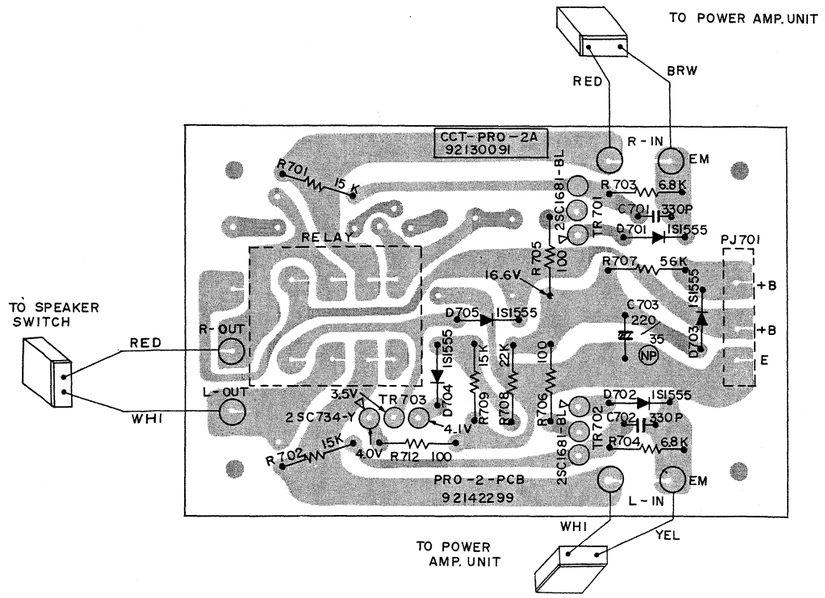




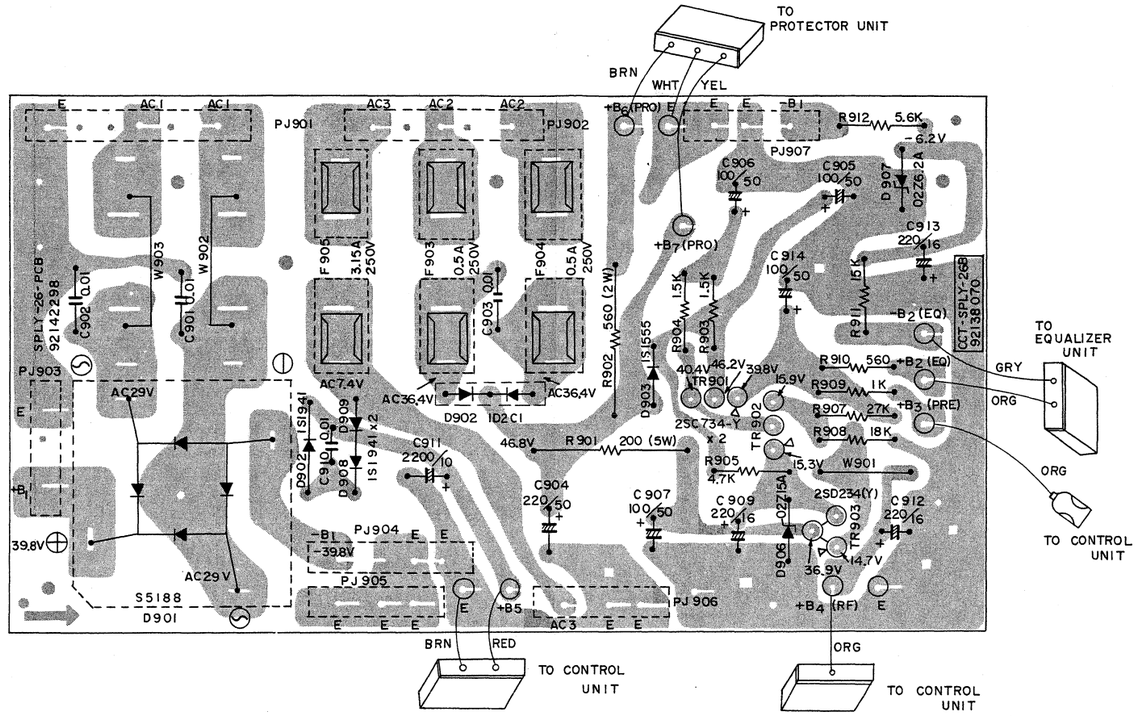
(Fig. 8)

7. ELECTRICAL PARTS LOCATIONS

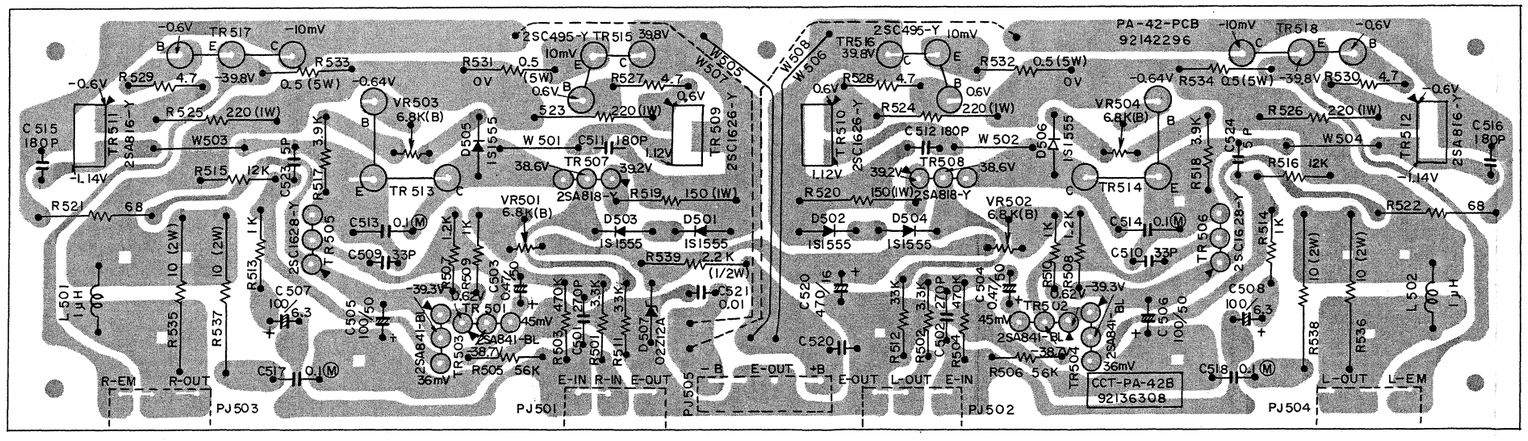
7–1 BOTTOM VIEW OF PROTECTOR P.C. BOARD (PRO–2A UNIT)



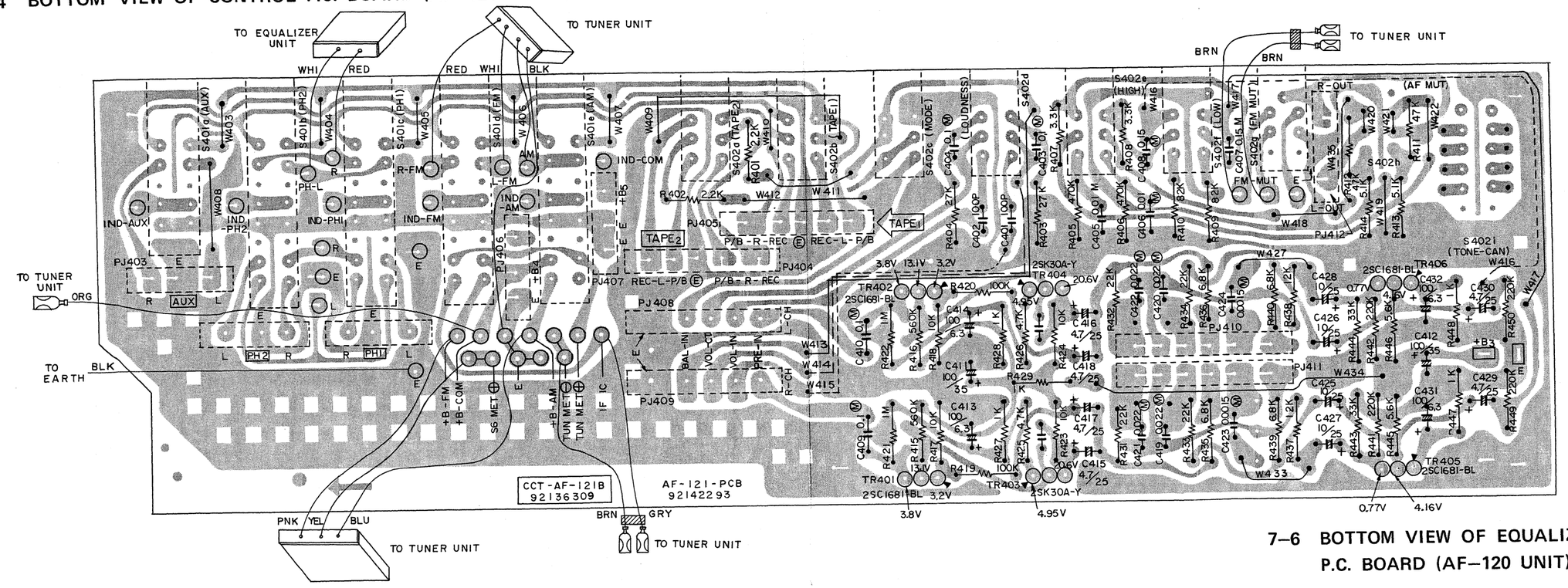
7–2 BOTTOM VIEW OF SUPPLY P.C. BOARD (SPLY–26 UNIT)



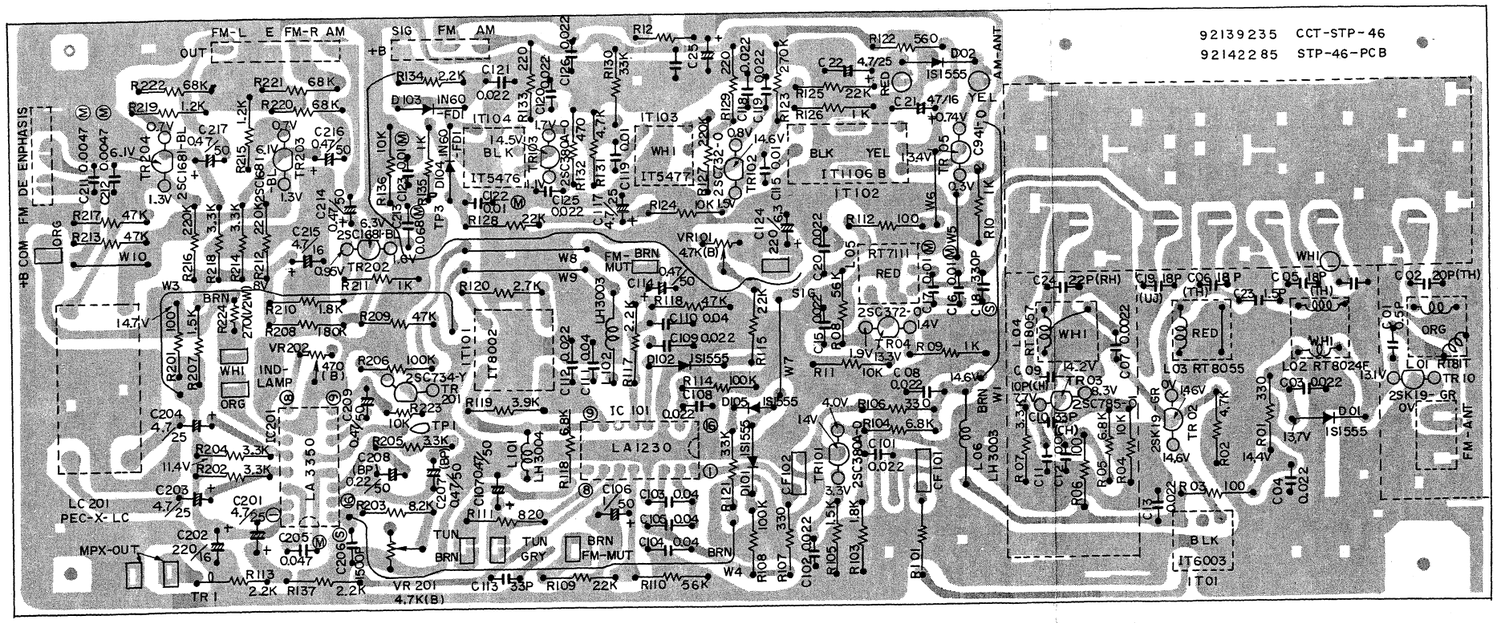
7–3 BOTTOM VIEW OF POWER AMP. P.C. BOARD (PA–42B UNIT)



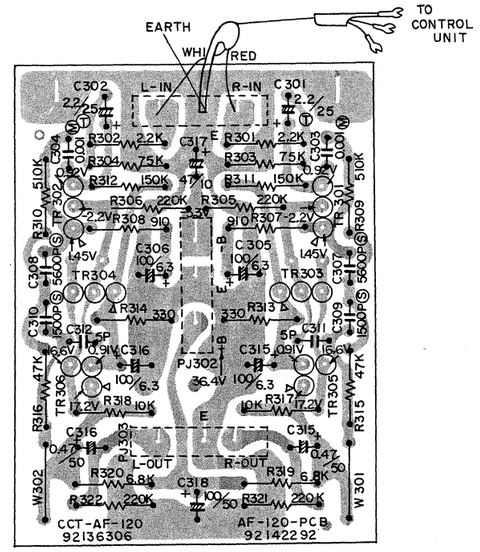
7–4 BOTTOM VIEW OF CONTROL P.C. BOARD (AF–121B UNIT)



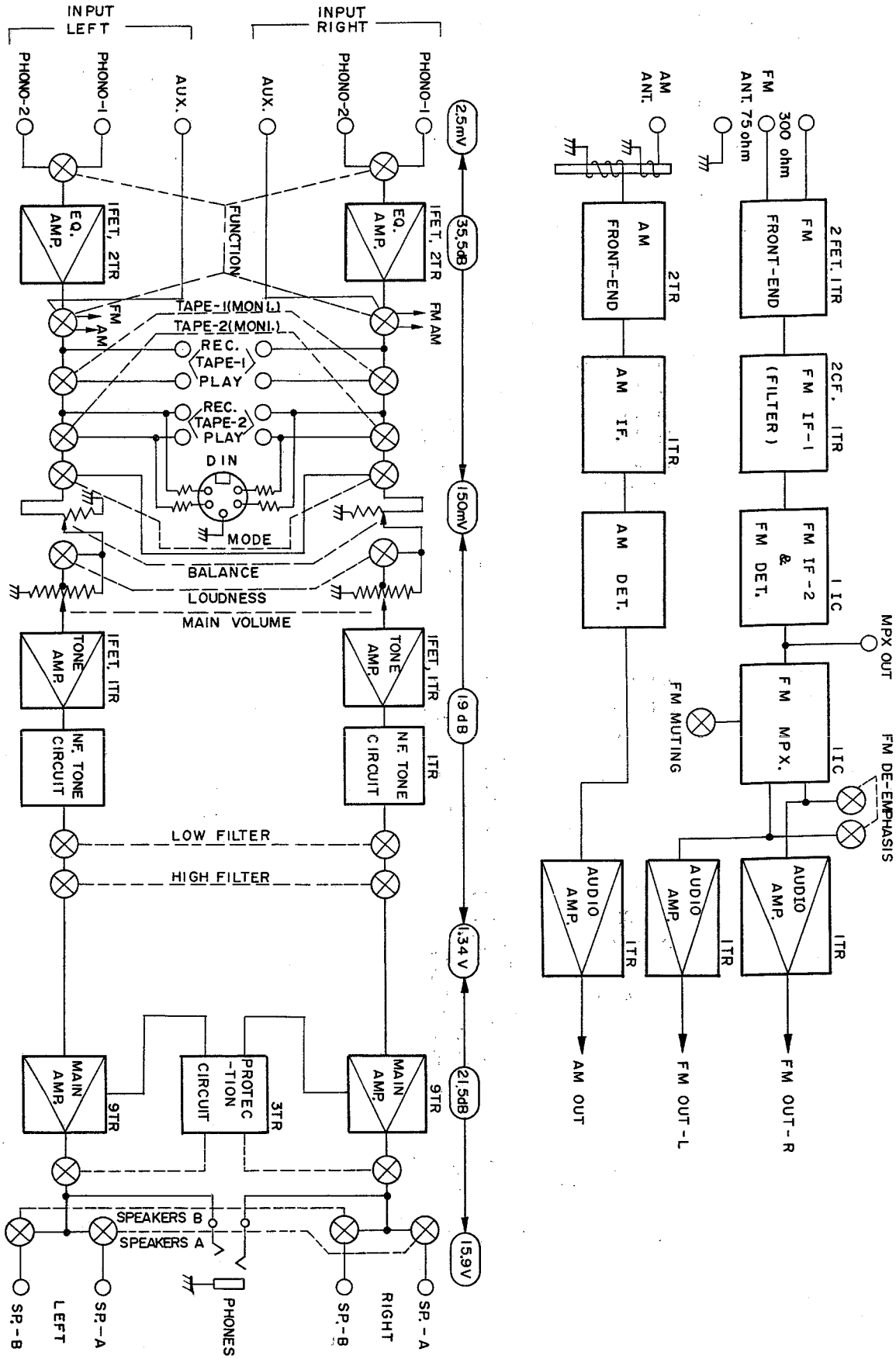
7–5 BOTTOM VIEW OF TUNER P.C. BOARD (STP–46 UNIT)



7–6 BOTTOM VIEW OF EQUALIZER P.C. BOARD (AF–120 UNIT)

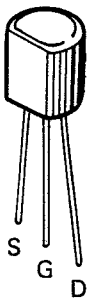


8. BLOCK DIAGRAM

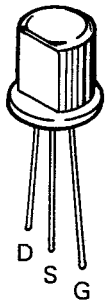


9. SEMICONDUCTOR BASE DIAGRAMS

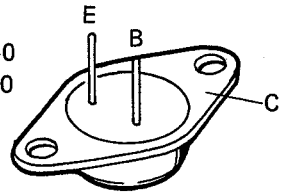
2SK30A-Y



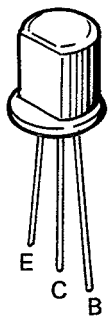
2SK19-GR



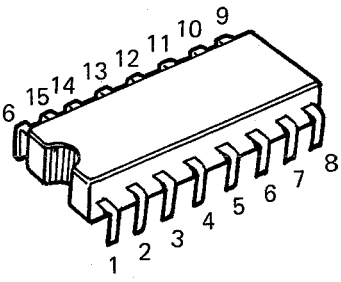
2SD371-0
2SB531-0



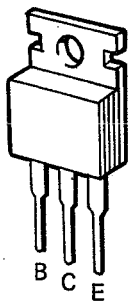
2SC1681-BL
2SC734-Y
2SA841-BL
2SC785-0
2SC372-0
2SC941-0
2SC380A-0



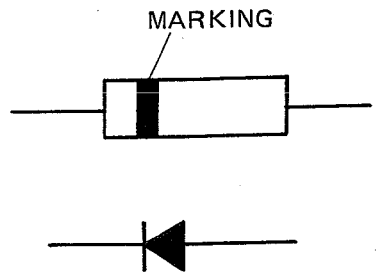
IC-LA3350
IC-LA1230



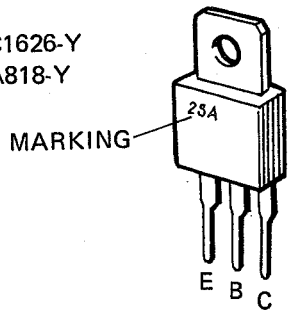
2SD234-Y
2SC1669-Y
2SA816-Y



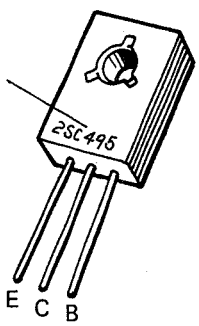
1S1555-V-JA
1S1941
02Z15A
02Z6.2A
02Z24A
1N60-FD1



2SC1626-Y
2SA818-Y



MARKING
2SC495-Y

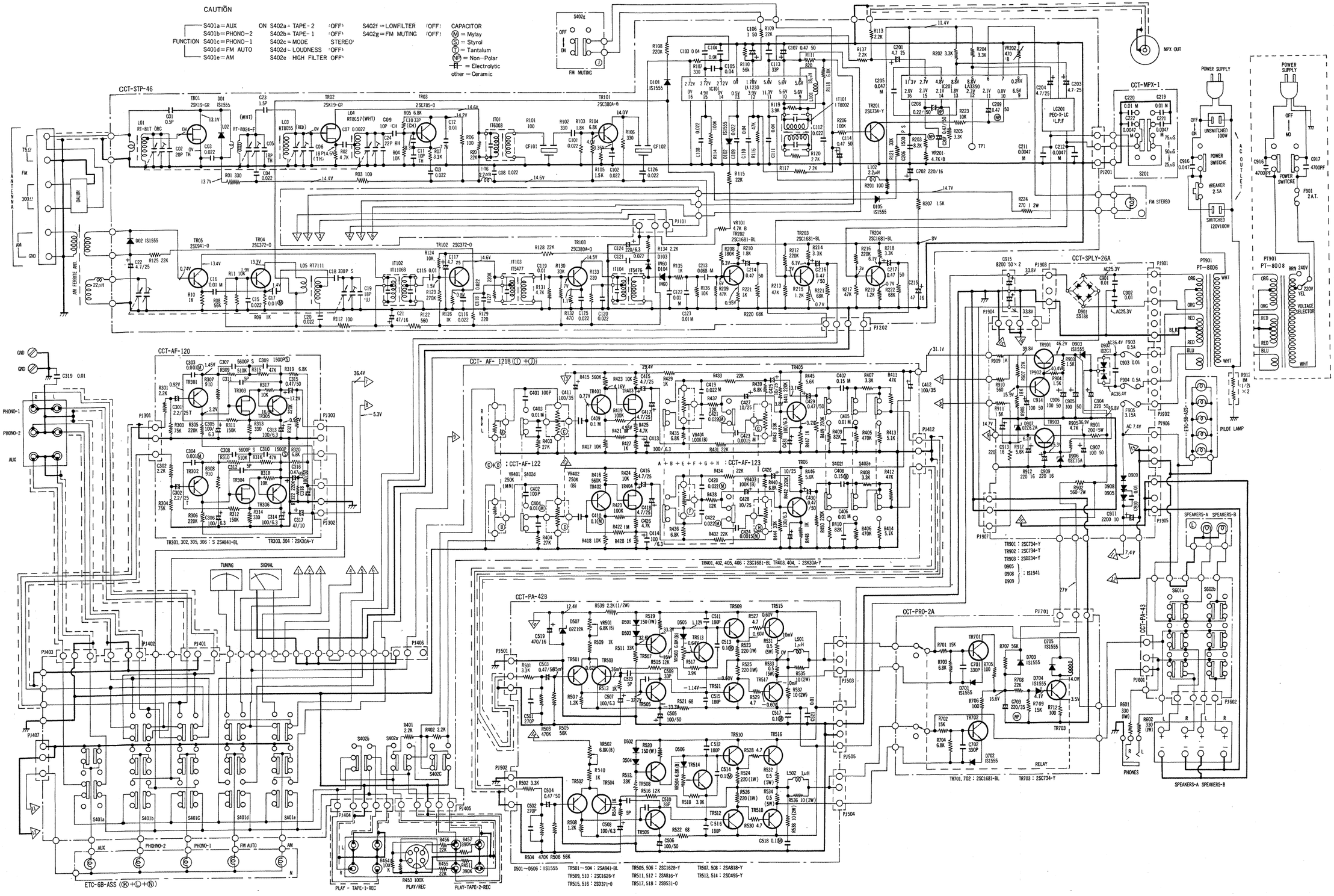


E ..... Emitter
C ..... Collector
B ..... Base

S ..... Source
D ..... Drain
G ..... Gate

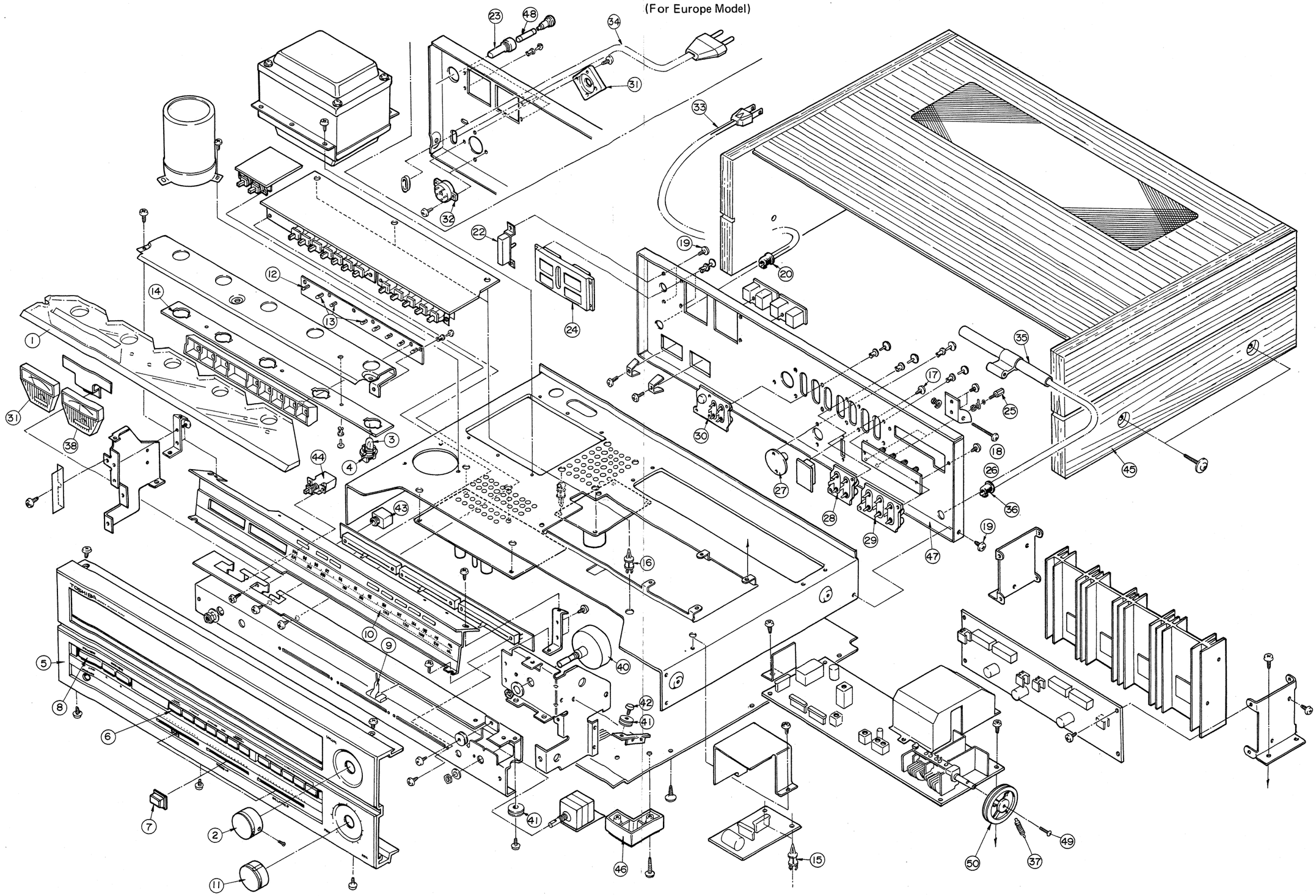
(Fig. 9)

10. SCHEMATIC DIAGRAM



11. CABINET EXPLODED VIEW

(For Europe Model)



12. PARTS LIST

Symbol No.	Part No.	Description
		ELECTRICAL AND MECHANICAL PARTS
S201	22146650	Switch, Slide (FM De-emphasis)
R601,602	22570054	Resistor, 330 ohm, 1W
R912	20052212	Resistor Ass'y (For U.S.A., Canada)
C915	22430053	Electrolytic Capacitor 8200 + 8200 mfd
C916	22310019	Capacitor, 0.047mfd, 125V (For U.S.A., Canada)
C916	22340088	Capacitor 4700pF, 250V (For Europe)
PT901	22213479	Transformer, Power (For U.S.A., Canada)
PT901	22213481	Transformer, Power (For Europe)
1	20033074	Reflector
2	20871241	Knob, Tuning
3	22113377	Pilot Lamp, 8V, 300mA, BL
4	22116092	Wedge Base
5	20017101	Panel Ass'y
	20703060	Compression, Spring
	20763189	Knob Shaft
6	20871259	Button-A-Ass'y
7	20871262	Button-B-Ass'y
8	20871265	Button-C-Ass'y
9	20041052	Pointer Ass'y
10	20071053	Dial Scale Ass'y
11	22826123	Knob Ass'y, Volume
12	22113319	Lamp, Indicator, 6.3V, 35mA
13	22113383	Lamp, Indicator, 8V, 60mA
14	22143818	P.C. Board, ETC-8
15	20022049	Holder, PCB
16	20022097	Holder, PCB
17	70432604	Screw (BID), M2.6x4 mm, Black
18	70433006	Screw (BID), M3x6 mm, Black
19	71233006	Screw (BID, Tapping), M3x6 mm, Black
20	20021170	Cord Bushing (For U.S.A., Canada)
21	25845556	Cord Bushing (For Europe)
22	22148627	Circuit Breaker (For U.S.A., Canada)
23	22165075	Fuse Holder (For Europe)
24	22162265	Speaker Terminal
25	22162327	Ground Terminal
26	22162402	Antenna Terminal
27	22163361	Jack, (US-1P)
28	22163443	Jack, (US-4P)
29	22163444	Jack, (US-6P)

Symbol No.	Part No.	Description
30	22163445	Jack, (US-4P, DIN)
31	20031041	Cover (For Europe)
32	22146087	Voltage Selector (For Europe)
33	22176221	Power Supply Cord (For U.S.A., Canada)
34	22176540	Power Supply Cord (For Europe)
35	22242602	Ferrite Antenna Ass'y
	22290002	Coil, FM Antenna
36	25845524	Cord Bushing (Ferrite Antenna)
37	20866009	Tension Spring
38	22104298	Tuning Meter
39	22104306	Signal Meter
40	20041055	Tuning Shaft Ass'y
41	20042058	Pulley
42	20794119	Screw, M3x10 mm (Pulley)
43	22163313	Jack, Headphones
44	22146759	Power Switch, Push (For U.S.A.. Canada)
44	22146204	Power Switch, Push (For Europe)
45	20815139	Cabinet Ass'y
46	20842077	Leg
	22950592	Label, Caution
47	20015113	Jack Plate (For U.S.A., Canada)
47	20015114	Jack Plate (For Europe)
48	22144195	Fuse, 2A, T (For Europe)
		ACCESSORIES
	22956405	Tag, FTC (Ply Wood)
	20951265	Owner's Manual
	22124223	FM Antenna
	22957189	Warranty Card (For U.S.A., Canada)
	22952524	Instruction Book
	20956169	Caution Label

Symbol No.	Part No.	Description
CCT – PRO – 2A		
TRANSISTORS AND DIODES		
TR701,702		Transistor, 2SC1681-BL
TR703		Transistor, 2SC734-Y
D701,702		Diode, 1S1555V-JA
703,704		
705		
CAPACITORS J=±5%, K=±10%, M=±20%, Z=–20% +80%, P=0%, +100%		
C701,702	22362331	Ceramic, 330pF, 50V, K
C703	22403060	Electrolytic, Nonpole, 220mfd, 35V
RESISTORS All resistors are ¼W, 5%, carbon film resistor unless otherwise noted.		
R701,702	22545153	15 K ohm
709		
R703,704	22545682	6.8 K ohm
R705,706	22545101	100 ohm
712		
R707	22545563	56 K ohm
R708	22545223	22 K ohm
ELECTRICAL PART		
	22148625	Relay 24V, 5A
.CCT – PA – 42B		
TRANSISTORS AND DIODES		
TR501,502		Transistor, 2SA841-BL
503,504		
TR505,506		Transistor, 2SC1626-Y
TR507,508		Transistor, 2SA818-Y
TR509,510		Transistor, 2SC1669-Y
TR511,512		Transistor, 2SA816-Y
TR513,514		Transistor, 2SC495-Y
TR515,516		Transistor, 2SD371-O
TR517,518		Transistor, 2SB531-O
D501,502		Diode, 1S1555V-JA
503,504		
505,506		
D507		Diode, 02Z12A

Symbol No.	Part No.	Description
CAPACITORS J=±5%, K=±10%, M=±20%, Z=–20% +80%, P=0% +100%		
C501,502	22362271	Ceramic, 270pF, 50V, K
C503,504	22448478	Electrolytic, 0.47mfd, 50V
C505,506	22448101	Electrolytic, 100mfd, 50V
C507,508	22442101	Electrolytic, 100mfd, 6.3V
C509,510	22362330	Ceramic, 33pF, 50V, K
C511,512	22362181	Ceramic, 180pF, 50V, K
515,516		
C513,514	22372104	Mylar, 0.1mfd 50V, K
517,518		
C519	22445471	Electrolytic, 470mfd, 16V
C521	22342103	Ceramic, 0.01mfd, 50V, Z
C523,524	22362509	Ceramic, 5pF, 50V, K
RESISTORS All resistors are ¼W, 5%, carbon film resistor unless otherwise noted.		
R501,502	22545332	3.3 K ohm
R503,504	22545474	470 K ohm
R505,506	22545563	56 K ohm
R507,508	22545122	1.2 K ohm
R509,510	22545102	1 K ohm
513,514		
R511,512	22545333	33 K ohm
R515,516	22545123	12 K ohm
R517,518	22545392	3.9 K ohm
R519,520	22570048	150 ohm, 1W
R521,522	22545680	68 ohm
R523,524	22570049	220 ohm, 1W
525,526		
R527,528	22545479	4.7 ohm
529,530		
R531,532	22500127	0.5 ohm, 5W
533,534		
R535,536	22570103	10 ohm, 2W
537,538		
R539	22563222	2.2 K ohm, ½W
VR501,502	22658401	Semi-fixed Resistor, 6.8 K ohm
503,504		
ELECTRICAL AND MECHANICAL PARTS		
	20794089	Plastic Screw, M3x8 mm
L501,502	22210107	Coil, 1μH

Symbol No.	Part No.	Description
CCT – AF – 120		
TRANSISTORS		
TR301,302		Transistor, 2SA841-BL
305,306		
TR303,304		Transistor, 2SK30A-Y
CAPACITORS **J=±5%, K=±10%, M=±20%, Z=–20% +80%,** **P=0% +100%, G=±2%**		
C301,302	22401010	Electrolytic, 2.2mfd, 25V
C303,304	22372102	Mylar, 0.001pF, 50V, K
C305,306	22442101	Electrolytic, 100mfd, 6.3V
C307,308	22380033	Polystyrene, 56000pF, 50V, G
C309,310	22380035	Polystyrene, 1500pF, 50V, G
C311, 312	22362509	Ceramic, 5pF, 50V, K
C315,316	22448478	Electrolytic, 0.47mfd, 50V
C317	22443470	Electrolytic, 47mfd, 10V
C318	22448101	Electrolytic, 100mfd, 50V
RESISTORS **All resistors are ¼W, 5%, carbon film resistors unless otherwise noted.**		
R301,302	22545222	2.2 K ohm
R303,304	22545753	75 K ohm
R305,306	22545224	220 K ohm
321,322		
R307,308	22545911	910 ohm
R309,310	22545514	510 K ohm
R311, 312	22545154	150 K ohm
R313,314	22545331	330 ohm
R315,316	22545473	47 K ohm
R317,318	22545103	10 K ohm
R319,320	22545682	6.8 K ohm
CCT – AF – 121B		
TRANSISTORS		
TR401,402		Transistor, 2SC1681-BL
405,406		
TR403,404		Transistor, 2SK30A-Y
CAPACITORS **J=±5%, K=±10%, M=±20%, Z=–20% +80%** **P=0% +100%**		
C401,402	22362101	Ceramic, 100pF, K
C403,404	22372103	Mylar, 0.01mfd, K
405,406		

Symbol No.	Part No.	Description
C407,408	22372154	Mylar, 0.15mfd, K
C409,410	22372104	Mylar, 0.1mfd, K
C411,412	22447101	Electrolytic, 100mfd, 35V
C413,414	22442101	Electrolytic, 100mfd, 6.3V
431,432		
C415,416	22446479	Electrolytic, 4.7mfd, 25V
417,418		
429,430		
C419,420	22372223	Mylar, 0.022mfd, K
421,422		
C423,424	22372152	Mylar, 0.0015mfd, K
C425,426	22446100	Electrolytic, 10mfd, 25V
427,428		
RESISTORS **All resistors are ¼W, 5%, carbon film resistors unless otherwise noted.**		
R401,402	22545222	2.2 K ohm
R403,404	22545273	27 K ohm
R405,406	22545474	470 K ohm
R407,408	22545332	3.3 K ohm
R409,410	22545823	82 K ohm
R411,412	22545473	47 K ohm
R413,414	22545512	5.1 K ohm
R415,416	22545564	560 K ohm
R417,418	22545103	10 K ohm
423,424		
R419,420	22545104	100 Kohm
R421, 422	22545105	1 M ohm
R425,426	22545472	4.7 K ohm
R427,428	22545102	1 K ohm
429,447		
448		
R431,432	22545223	22 K ohm
433,434		
R435,436	22545682	6.8 K ohm
439,440		
R437,438	22545123	12 K ohm
R441,442	22545224	220 K ohm
449,450		
R443,444	22545333	33 K ohm
R445,446	22545562	5.6 K ohm
ELECTRICAL AND MECHANICAL PARTS		
S401	22146102	Switch, Push (Function)
S402	22146104	Switch, Push (Accessory)

Symbol No.	Part No.	Description
CCT – SPLY – 26		
TRANSISTORS AND DIODES		
TR901,902		Transistor, 2SC734-Y
TR903		Transistor, 2SD234-Y
D901		Diode, S5188
D902		Diode, 1D2C1
D903		Diode, 1S1555V-JA
D905,908		Diode, 1S1941
909		
D906		Diode, 02Z15A
D907		Diode, 02Z6.2A
CAPACITORS J=±5%, K=±10%, M=±20%, Z=–20% +80%, P=0% +100%		
C901,902	22341103	Ceramic, 0.01mfd, 50V, Z
903,910		
C904	22448221	Electrolytic, 220mfd, 50V
C905,906	22448101	Electrolytic, 100mfd, 50V
907,914		
C909,912	22445221	Electrolytic, 220mfd, 16V
913		
C911	22443222	Electrolytic, 2200mfd, 10V
RESISTORS All resistors are ¼W, 5%, carbon film resistors unless otherwise noted		
R901	22500128	200 ohm, 5W, 10%
R902	22570036	560 ohm, 2W, 10%
R903,904	22545152	1.5 K ohm
R905	22545472	4.7 K ohm
R907	22545273	27 K ohm
R908	22545183	18 K ohm
R909	22545102	1 K ohm
R910	22545561	560 ohm
R911	22545153	15 K ohm
R912	22545562	5.6 K ohm
ELECTRICAL AND MECHANICAL PARTS		
F903,904	22144277	Fuse, A501NM-U, 0.5A (For U.S.A. and Canada)
F903,904	22144287	Fuse, B501 ... S (For Europe) 500mA.T
F905	22144297	Fuse, B322NR-U 3.15A (For U.S.A and Canada)
F905	22144283	Fuse, B302SL-S (For Europe) 3.15A.T
	22165036	Fuse Holder(For U.S.A and Canada)
	22165076	Fuse Holder (For Europe)

Symbol No.	Part No.	Description
CCT – STP – 46		
TRANSISTORS, IC'S AND DIODES		
IC101	22114443	Integrated Circuit, LA1230
IC201	22114416	Integrated Circuit, LA3350
TR01,02		Transistor, 2SK19-GR
TR03		Transistor, 2SC785-0
TR04,102		Transistor, 2SC372-0
TR05		Transistor, 2SC941-0
TR101,103		Transistor, 2SC380A-0
TR201		Transistor, 2SC734-Y
TR202,203		Transistor, 2SC1681-BL
204		
D01,02		Diode, 1S1555V-JA
101,102		
105		
D103,104		Diode, 1N60-FD1
CAPACITORS J=±5%, K=±10%, M=±20%, Z=–20% +80%, P=0% +100%		
C01	22360074	Ceramic, 0.5pF, K
C02	22360260	Ceramic, 20pF, K
C03,04,08	22341223	Ceramic, 0.022mfd, 50V, P
13,15,20		
101,102		
108,109		
112,116		
118,120		
121,125		
126		
C05,06	22360261	Ceramic, 18pF, 50V, K
C07	22341222	Ceramic, 0.0022mfd, 50V, P
C09	22360207	Ceramic, 10pF, 50V, K
C10	22360226	Ceramic, 33pF, 50V, K
C11	22360208	Ceramic, 10pF, 50V, K
C12,115	22341103	Ceramic, 0.01mfd, 50V, P
C119		
C16,17	22372103	Mylar, 0.01mfd, K
122,123		
C18	22321049	Plastic Film, 330pF, 50V, J
C19	22360264	Ceramic, 33pF, 50V, K
C23	22360076	Ceramic, 1.5pF, 50V, K
C24	22360091	Ceramic, 22pF, 50V, J
C103,104	22341403	Ceramic, 0.04mfd, P
105,110		
111		
C106	22448109	Electrolytic, 1mfd, 50V

Symbol No.	Part No.	Description
C107,114 214,216 217	22448478	Electrolytic, 0.47mfd, 50V
C113	22362330	Ceramic, 33pF, 50V, K
C124	22442221	Electrolytic, 220mfd, 6.3V
C201,203 204,117 22	22446479	Electrolytic, 4.7mfd, 25V
C202	22445221	Electrolytic, 220mfd, 16V
C205	22372473	Mylar, 0.047mfd, K
C206	22321059	Plastic Film, 1500pF, J
C207,209	22403054	Electrolytic, Nonpole, 0.47mfd, 50V
C208	22403053	Electrolytic, Nonpole, 0.22mfd, 50V
C211,212	22372472	Mylar, 0.0047mfd, 50V, K
C215,21	22445470	Electrolytic, 47mfd, 16V
C213	22372683	Mylar, 0.068mfd, 50V, K
RESISTORS **All resistors are ¼W, 5%, carbon film resistors unless otherwise noted.**		
R01,106 107	22545331	330 ohm
R03,06,112, 201	22545101	100 ohm
R04,11,124 136,223	22545103	10 K ohm
R05,104 118	22545682	6.8 K ohm
R08,110	22545563	56 K ohm
R09,10,126 135,211	22545102	1 K ohm
R103 210	22545182	1.8 K ohm
R127, 212 216	22545224	220 K ohm
R109,115 20,125,128	22545223	22 K ohm
R111	22545821	820 ohm
R113,117 134,137	22545222	2.2 K ohm
R114,108 206	22545104	100 K ohm
R116,209 213,217	22545473	47 K ohm
R119	22545392	3.9 K ohm
R120	22545272	2.7 K ohm
R121,130	22545333	33 K ohm
R122	22545561	560 ohm

Symbol No.	Part No.	Description
R123	22545274	270 K ohm
R129,133	22545221	220 ohm
R131,02	22545472	4.7 K ohm
R132	22545471	470 ohm
R202,204 205,214 218,07	22545332	3.3 K ohm
R203	22545822	8.2 K ohm
R207,105	22545152	1.5 K ohm
R208	22545184	180 K ohm
R215,219	22545122	1.2 K ohm
R220,221 222	22545683	68 K ohm
R224	22563271	270 ohm, ½W
VR101,201	22658318	Semi-fixed Resistor, 4.7 K ohm
VR202	22658260	Semi-fixed Resistor, 470 ohm
ELECTRICAL AND MECHANICAL PARTS		
49	70432606	Screw (BID) M2.6x6 mm
50	22742125	Drum
VC01	22307106	Variable Condenser
LC201	22135017	Lowpass Filter
CF101,102	22153023	Ceramic Filter
L01	22292051	Coil, Trap
L02	22294294	Coil, Trap
L03	22294217	Coil, Trap
L04	22295016	Coil, Trap
L05	22245206	Coil, Oscillator
L06,102	22291082	Coil, Trap
L101	22291083	Coil, Trap
IT01	22265681	Coil, IFT
IT101	22267327	Coil, IFT
IT102	22264643	Coil, IFT
IT103	22264626	Coil, IFT
IT104	22266308	Coil, IFT
CCT – AF – 122		
VR402	22650025	Variable Resistor (Detent) Volume Control
CCT – AF – 123		
VR401	22657156	Variable Resistor (Slide) BALANCE, 250 K ohm, MN
VR403,404	22657155	Variable Resistor (Slide) BASS, TREBLE 100 K ohm, B
CCT – PA – 43		
S601	22146101	Switch, Push (Speaker)